Abstract Submitted to the
International Conference on Strongly Correlated Electron Systems
University of Michigan, Ann Arbor
August 6-10, 2001

Probing magnetic correlations in heavy fermion CeMIn$_5$ (M=Rh, Ir, Co) with neutron scattering

W. Bao[1], P.G. Pagliuso[1], A.D. Christianson[1], J.L. Sarrao[1], J.D. Thompson[1], G. Aeppli[2], Z. Fisk[6], J.S. Gardner[5], J.W. Lynn[3], S. Raymond[4], A.H. Lacerda[1]

[1] *Los Alamos National Laboratory, Los Alamos, NM 87544, USA*
[2] *NEC Research, 1 Independent Way, Princeton, NJ 08540, USA*
[3] *National Institute of Standard and Technology, Gaithersburg, MD 20899, USA*
[4] *CEA-Grenoble, 38054 Grenoble Cedex 9, France*
[5] *Chalk River Laboratories, Chalk River, Ontario K0J 1J0, Canada*
[6] *Florida State University, Tallahassee, FL 32306, USA*

Antiferromagnetism and superconductivity, with very high transition temperatures for heavy fermion compounds, exist in close proximity in the heavy fermion materials with chemical formula CeMIn$_5$ (M=Rh,Ir,Co). These tetragonal materials consist of alternating layers of the cubic heavy fermion antiferromagnet CeIn$_3$ and the intervening MIn2. Magnetic structures of the heavy fermion antiferromagnets CeRhIn$_5$, Ce$_2$RhIn$_8$, Ce(Rh,Ir)In$_5$, and (Ce,La)RhIn$_5$ are determined using neutron diffraction. Dynamic magnetic correlations of CeRhIn$_5$, CeIrIn$_5$ and CeCoIn$_5$ are investigated with inelastic neutron scattering. Effects of hydrostatic pressure and magnetic field on the antiferromagnetic orders are also investigated. Insight on relation between the quasi-two-dimensional crystal structure, antiferromagnetism and superconductivity in these new heavy fermion materials, obtained through systematic study of the family with various M, changing ratio of the CeIn$_3$ and MIn$_2$ layers, doping on the Ce site, and external fields, will be discussed.